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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/116,589	07/16/1998	SHINGO NISHIKAWA	Q51098	2728

7590 12/12/2003

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WASHINGTON, DC 200373202

EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/116,589

Applicant(s)

NISHIKAWA ET AL.

Examiner

Audrey Y. Chang

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MLW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28, 29 and 64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28, 29 and 64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 16, 2003 has been entered.
2. This Office Action is also in response to applicant's amendment filed on July 16, 2003, which has been entered as paper number 32.
3. By this amendment, the applicant has amended claims 28 and 29 and has canceled claims 1-27, and 30-63.
4. Claims 28, 29 and 64 remain pending in this application.

Claim Objections

5. **Claims 28, 29 and 64 are objected to because of the following informalities:**

(1) The claims fail to provide structural and logical relationships among the various terms recited in the claims. It is not clear how does the "a hologram recorded medium", "a collection of pixels", "a plurality of volume type diffraction gratings comprising volume holograms" relate to the "photosensitive material" and "interference fringes" recited in claims 28 and 29. The lacking of these structural and logical relationships makes the claims incomplete and makes the scopes of the claims unclear.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 28 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Wreede et al (PN. 5,499,118) in view of the patents issued to Dausmann et al (PN. 5,825,514) and Moss et al (PN. 5,016,953).**

Wreede et al teaches a system and method for copying *multiple holograms* to create a *hologram-recorded medium*, wherein the method comprises *stacking* a hologram-recording layer (35, Figure 1) on a first reflection master hologram (25). A first *reconstruction beam* (RB1) is illuminating the first reflection master hologram to create a first diffracted beam (DB1) wherein the first diffracted beam interferes with the first reconstruct beam to create a first *interference fringes* corresponding to a *first hologram* recorded within the hologram recording layer. Wreede et al teaches that a *second reflection master hologram* (29) is also used such that a second *reconstruction beam* (RB2) illuminates the second reflection master hologram and creates a *second diffracted beam* (DB2) wherein the second diffracted beam interferes with the second reconstruction beam to create a *second interference fringes* corresponding to a *second hologram* recorded within the hologram recording layer, (please see Figure 1). The recorded holograms serves as the *plurality of holograms* that can arbitrarily assigned to or belong to a collection of pixels.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the second reflection master hologram *replaces* the first mater hologram for recording the second hologram. However whether to utilize the step of “replacing” to record the first and second hologram one after the other or the step of having both master holograms present and recording the holograms simultaneously would achieve the same result, namely having both the first and second holograms recorded in the medium, such modification would have been obvious matters of design choices to one skilled in the art for the benefit of recording them one at time as desired.

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Wreede et al teaches that the hologram-recording layer may include *dichromated gelatin* (DCG), which is a *photosensitive materials*. Although this reference does not teach explicitly that the recorded of holograms are of *volume* type holograms, such feature is either inherently met or an obvious modification to one skilled in the art. Since DCG material is well known hologram recording material in the art for recording volume type hologram in order to achieve better diffraction efficiency. Such modification would then have been obvious to one skilled in the art for the benefit of recording the holograms as volume type to achieve the best diffraction efficiency.

Wreede also does not teach explicitly that the reflection master hologram is a relief hologram. However it is well known in the art that the *type* of master hologram used for copying holograms *do not effect* the recording process and the hologram formed. Dausmann et al in the same field of endeavor demonstrates to use a relief hologram as the master hologram for copying, (please see Figure 2, the relief hologram 11). Such modification would then have been obvious to one skilled in the art for the benefit of providing an alternative type of master hologram for copying the holograms. This reference also does not teach explicitly that the master holograms are computer-generated holograms. However computer generated holograms are extremely well known in the art and to use computer-generated master hologram for copying hologram, as demonstrated by the teachings of Moss et al, is also extremely well known in the art. It would then have been obvious to one skilled in the art to modify the mater holograms of Wreede by making them computer generated holograms for the benefit of providing master holograms with accurately calculated fringes and hologram pattern for achieving good recording quality.

With regard to claim 64, although these references do not teach explicitly to use an electronic beam to create the computer generated hologram, such feature is either inherently met by the disclosure or would have been an obvious modification to one skilled in the art since electronic beam is a common beam source in the art for lithographically creating fine pattern such as hologram pattern. One skilled in

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the art would be motivated to create computer-generated hologram with electronic beam for the benefit of easy accessibility.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Wreede et al (PN. 5,499,118) in view of the patents issued to Hopwood (PN. 4,915,464), Dausmann et al (PN. 5,825,514) and Moss et al (PN. 5,016,953).

Wreede et al teaches a system and method for copying *multiple holograms* to create a *hologram-recorded medium*, wherein the method comprises *stacking* a hologram-recording layer (135, Figure 2) on a *first transmission master hologram* (125). A first *reconstruction beam* (RB1) is illuminating the first transmission master hologram to create a first diffracted beam (DB1) wherein the first diffracted beam interferes with the first reconstruct beam to create a first *interference fringes* corresponding to a *first hologram* recorded within the hologram recording layer. Wreede et al teaches that a *second transmission master hologram* (129) is also used such that a second *reconstruction beam* (RB2) illuminates the second transmission master hologram and creates a *second diffracted beam* (DB2) such that the second diffracted beam interferes with the second reconstruction beam to create a *second interference fringes* corresponding to a *second hologram* recorded within the hologram recording layer, (please see Figure 1). The recorded hologram serves as the *plurality of holograms* that can be arbitrarily assigned to a collection of pixels.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the second transmission master hologram *replaces* the first mater hologram for recording the second hologram. However whether to utilize the step of “replacing” to record the first and second hologram one after the other or the step of having both master holograms present and recording the holograms simultaneously would achieve the same result, namely having both the first and second

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holograms recorded in the medium, such modification would have been obvious matters of design choices to one skilled in the art for the benefit of recording them one at time as desired.

Wreede et al teaches that the hologram-recording layer may include *dichromated gelatin* (DCG), which is a *photosensitive materials*. Although this reference does not teach explicitly that the recorded of holograms are of *volume* type holograms, such feature is either inherently met or an obvious modification to one skilled in the art. Since DCG material is well known hologram recording material in the art for recording volume type hologram in order to achieve better diffraction efficiency. Such modification would then have been obvious to one skilled in the art for the benefit of recording the holograms as volume type to achieve the best diffraction efficiency.

Wreede et al teaches that the holograms are recorded by having the diffracted beam from the master holograms interfere with the reconstruction beam for recording *transmission* type of holograms in the recording layer. However this reference does not teach explicitly to have the diffracted beam interfere with a coherent reference beam incident from *opposite* side of the master hologram in order to record a reflection type of holograms. But using transmission master hologram to record a reflection type hologram by having the reconstruction beam (then becomes diffracted beam after diffracted by the master hologram) and a reference beam intersect in *opposite* direction is a standard practice in the art as demonstrated by the teachings of Hopwood et al. Hopwood teaches to use a transmission master hologram (14, Figure 2) to record reflection type hologram in the recording layer (12) by having the reference beam (24) incident from the opposite side of the recording layer, (please see Figure 2). It would then have been obvious to one skilled in the art to modify the recording arrangement of Wreede accordingly for the benefit of recording reflection type instead of transmission type of holograms in the recording medium.

Wreede also does not teach explicitly that the transmission master hologram is a relief hologram. However it is well known in the art that the *type* of master hologram used for copying holograms *do not*

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effect the recording process and the hologram formed. **Dausmann** et al in the same field of endeavor demonstrates to use a relief hologram as the master hologram for copying, (please see Figure 2, the relief hologram 11). Such modification would then have been obvious to one skilled in the art for the benefit of providing an alternative type of master hologram for copying the holograms. This reference also does not teach explicitly that the master holograms are computer-generated holograms. However computer generated holograms are extremely well known in the art and to use computer-generated master hologram for copying hologram, as demonstrated by the teachings of **Moss** et al, is also extremely well known in the art. It would then have been obvious to one skilled in the art to modify the mater holograms of **Wreede** by making them computer generated holograms for the benefit of providing master holograms with accurately calculated fringes and hologram pattern for achieving good recording quality.

Response to Arguments

8. Applicant's arguments with respect to claims 28, 29 and 64, in conjunction with the newly amended features in the claims have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's arguments are mainly related to the newly added features and they have been fully addressed in the paragraphs above. The applicant is respectfully noted that a relief type hologram is not necessary a thin hologram. One of the factors for making thin or volume types hologram is the nature of recording material. Dichromated gelatin (DCG) is a art-recognized material for recording volume type hologram to achieve good diffraction efficiency. Also the type of hologram does not effect it being used as a master hologram for copying or fabricating other holograms, since it is the reconstructed image being used as an object light for recording the other hologram. Both the relief type hologram and other types of holograms are capable of creating reconstructed image to be used as the object light.

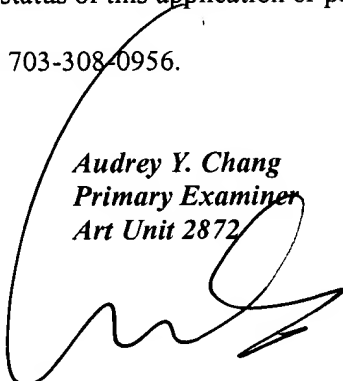
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
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A. Chang, Ph.D.